

EVALUATING THE ROLE OF SUBCANOPY COVER IN THE NET ECOSYSTEM CO₂ EXCHANGE IN AN IRRIGATED OLIVE ORCHARD OF SE SPAIN

José Ángel Callejas Rodelas

13/12/2021

AGU FALL
MEETING





JOSÉ ÁNGEL CALLEJAS RODELAS

MSc Student



UNIVERSIDAD
DE GRANADA





INTRODUCTION AND BACKGROUND

- Conventional agriculture management → alteration of Biogeochemical cycles
- SOC and soil fertility loss
- Monitoring GHG in agriculture ecosystems with differentiated management
- Olive orchards in Spain





OBJECTIVES

- Quantify CO₂ fluxes at a subcanopy level
- Evaluate differences in CO₂ fluxes for the two different soil treatments
- Relate variations of CO₂ fluxes to climatic conditions and ecosystem physiology over the year





METHODOLOGY

- Eddy Covariance site
- Two different soil treatments:
 - Weed Cover (WC)
 - Weed Free (WF) – application of herbicide
- Subcanopy towers → EC technique
 - Data selection based on wind direction





METHODOLOGY

Data treatment

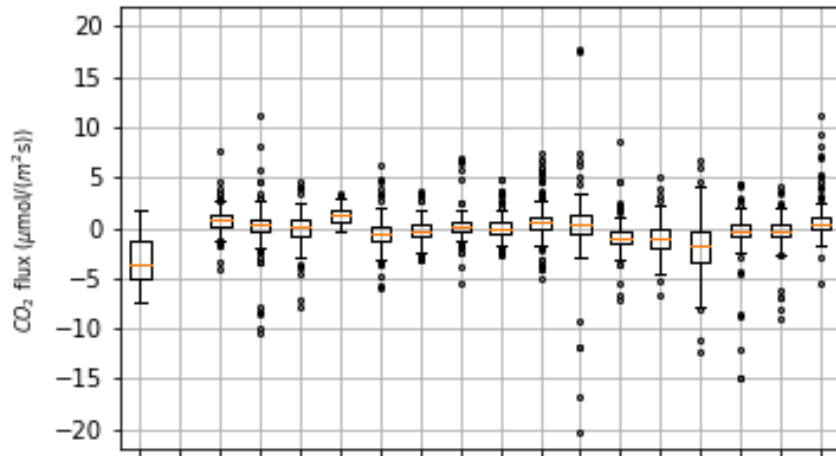
- Rotate coordinates
- Take data coming just from the olive orchard alleys



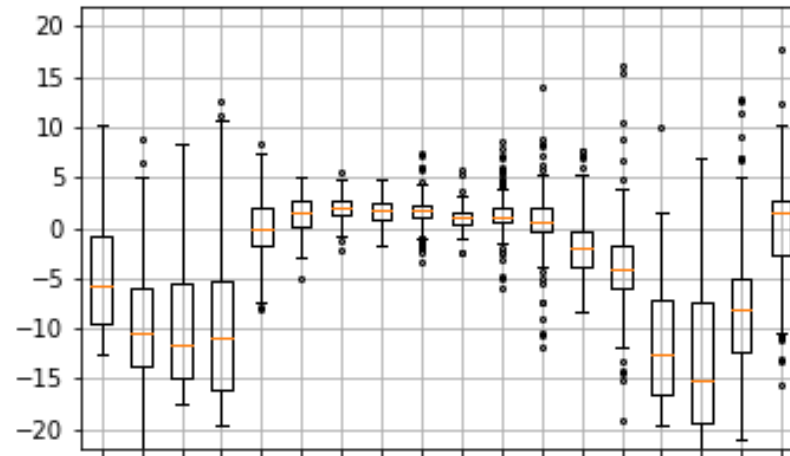


Diurnal and nocturnal CO₂ fluxes boxplots over the whole measurement period.

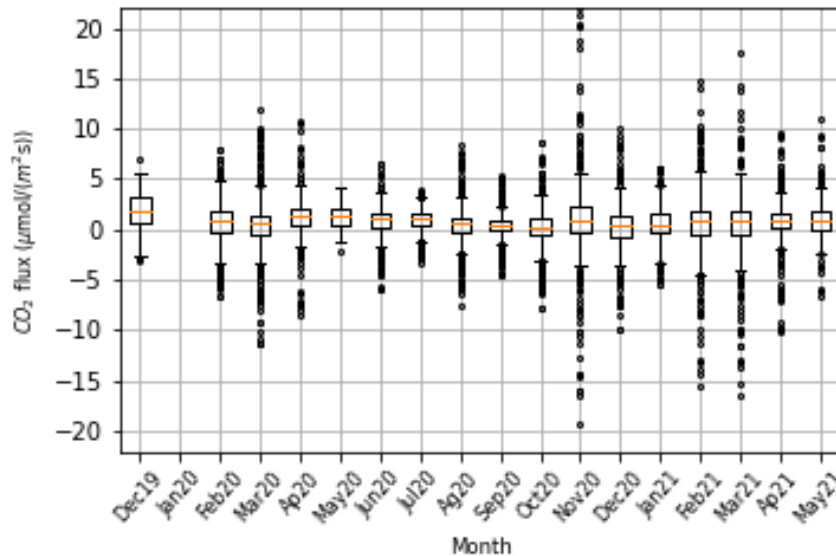
Boxplot for CO₂ diurnal fluxes, WF olive orchard



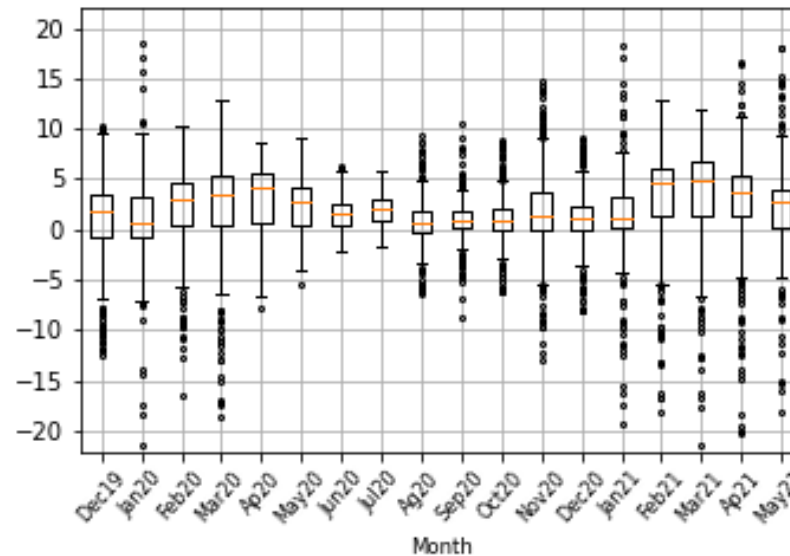
Boxplot for CO₂ diurnal fluxes, WC olive orchard



Boxplot for CO₂ nocturnal fluxes, WF olive orchard



Boxplot for CO₂ nocturnal fluxes, WC olive orchard



RESULTS

C uptake:

- Day in WC during weed growth season

C release:

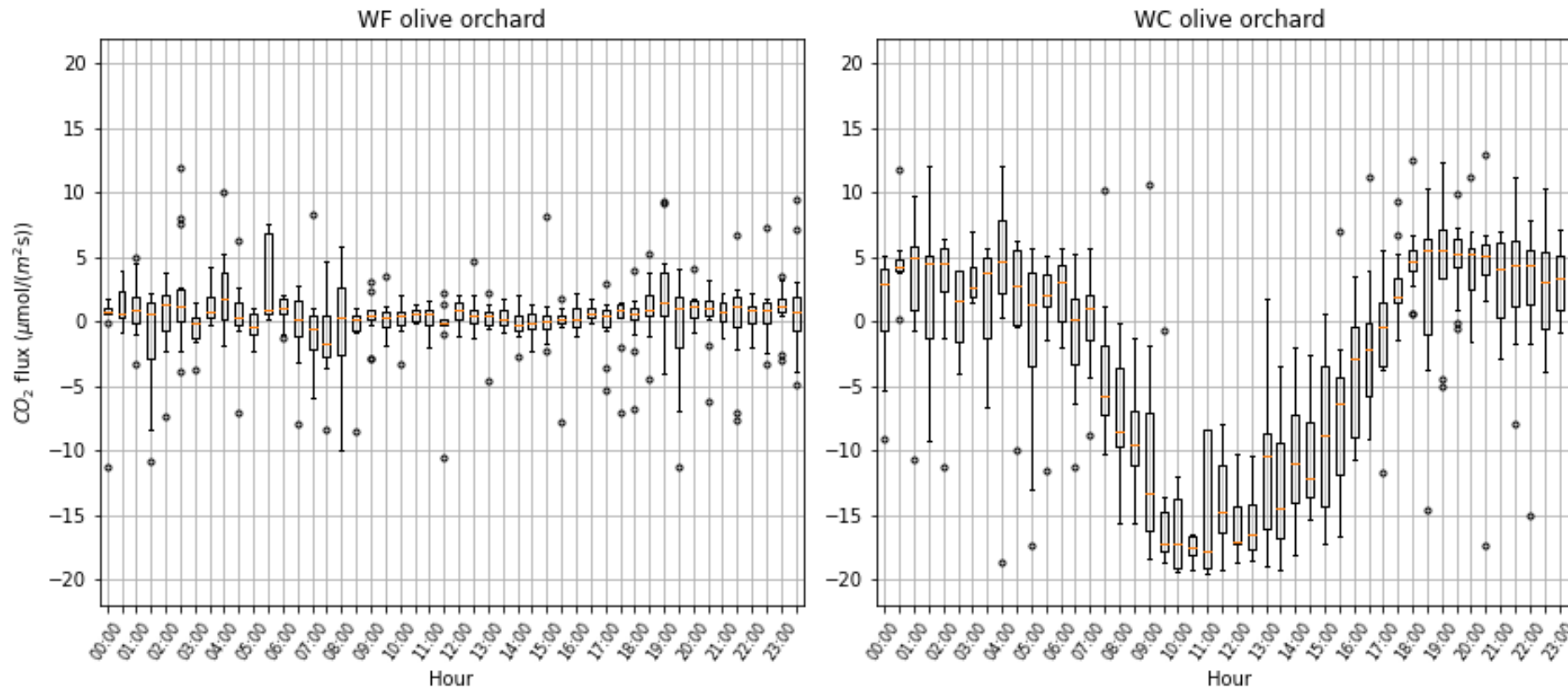
- Day and night in WF
- Night in WC
- Day in WC after weed cut



RESULTS

Before mowing 2020

Boxplot for CO_2 fluxes during a typical day for the period 15/03/20 - 07/04/20

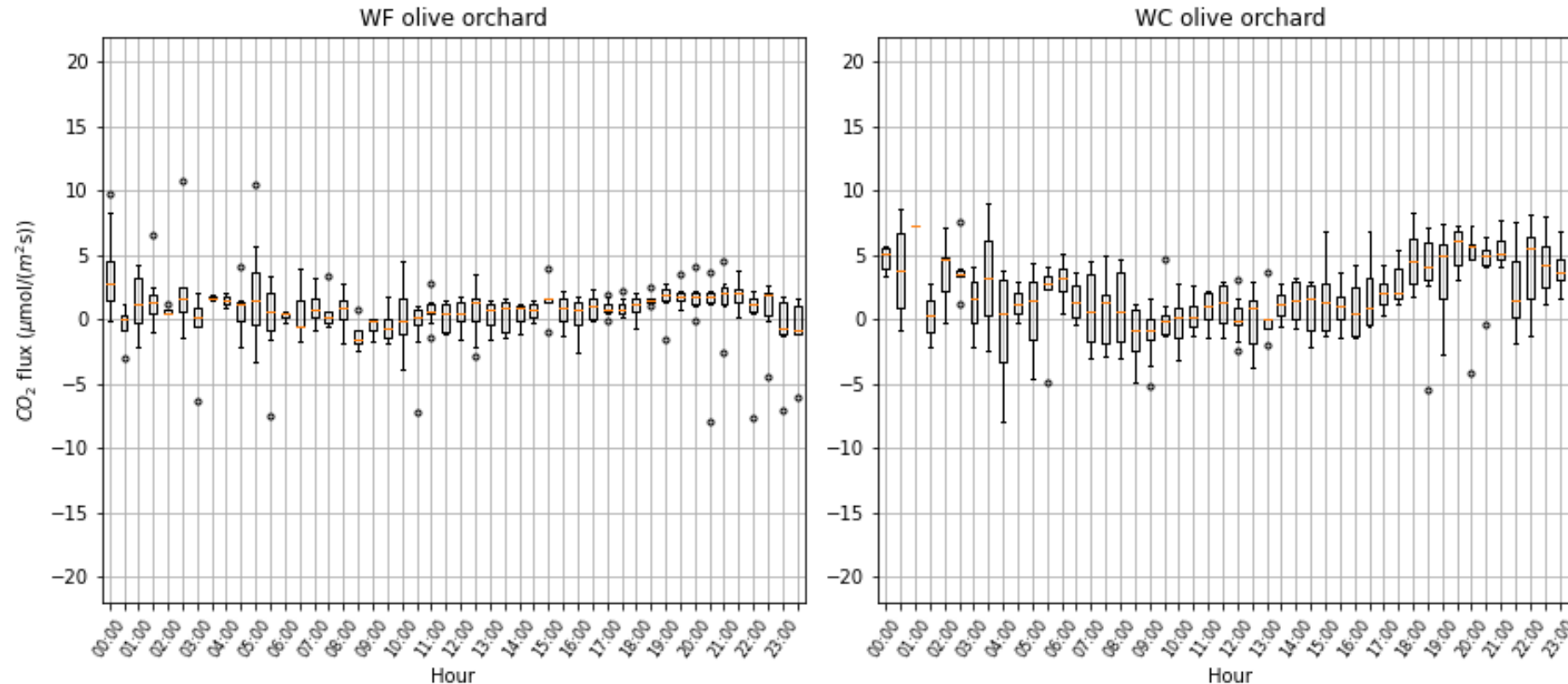




RESULTS

After mowing 2020

Boxplot for CO_2 fluxes during a typical day for the period 23/04/20 - 31/05/20



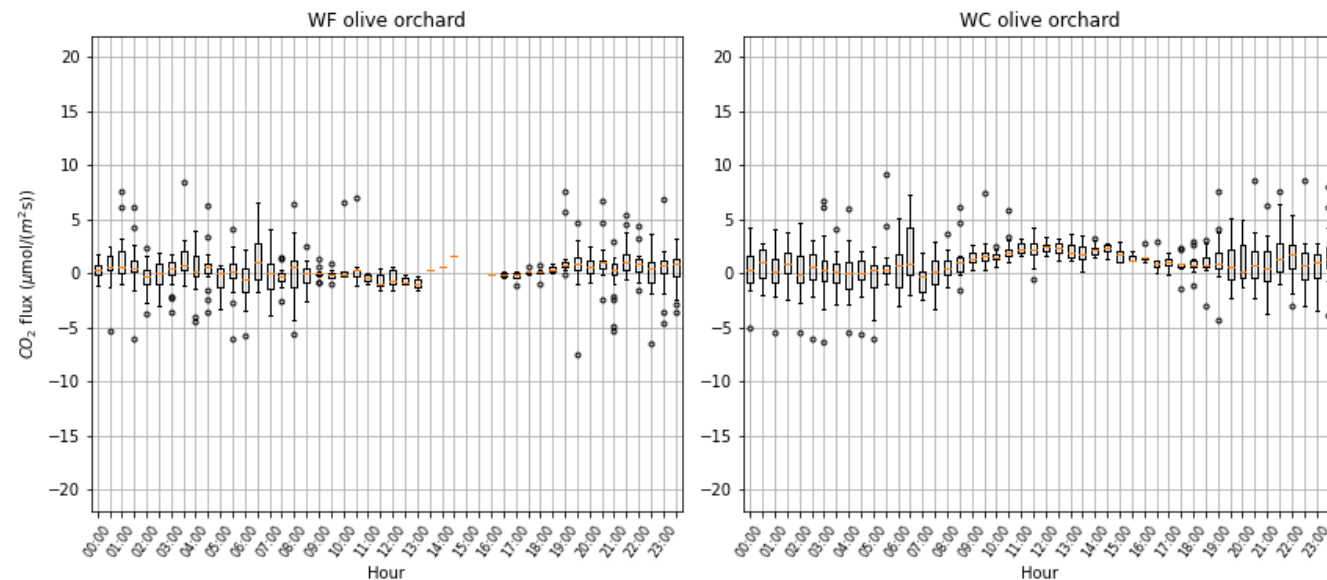


RESULTS

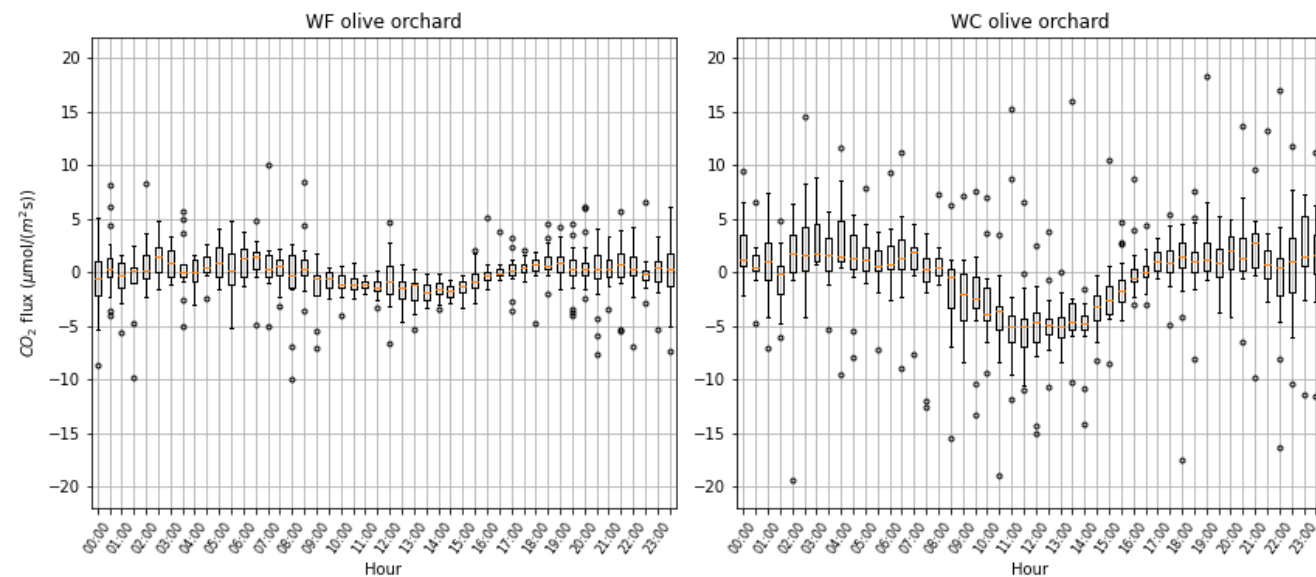
August 2020



Boxplot for CO₂ fluxes during a typical day for the period 01/08/20 - 31/08/20



Boxplot for CO₂ fluxes during a typical day for the period 15/12/20 - 31/01/21



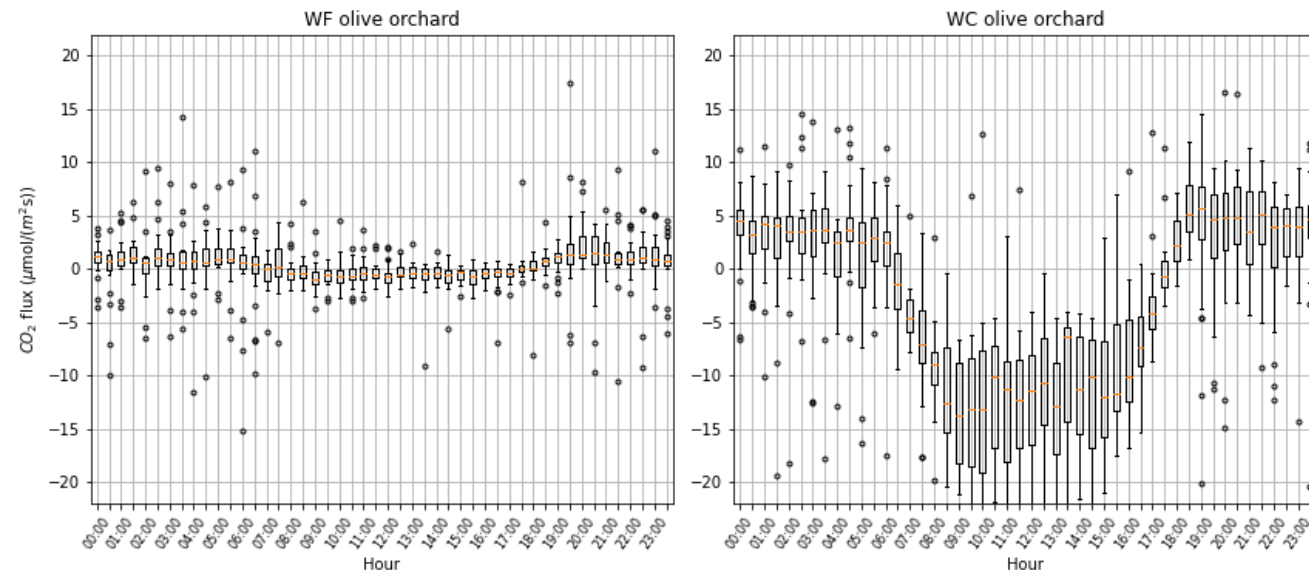
Dec20 - Jan21



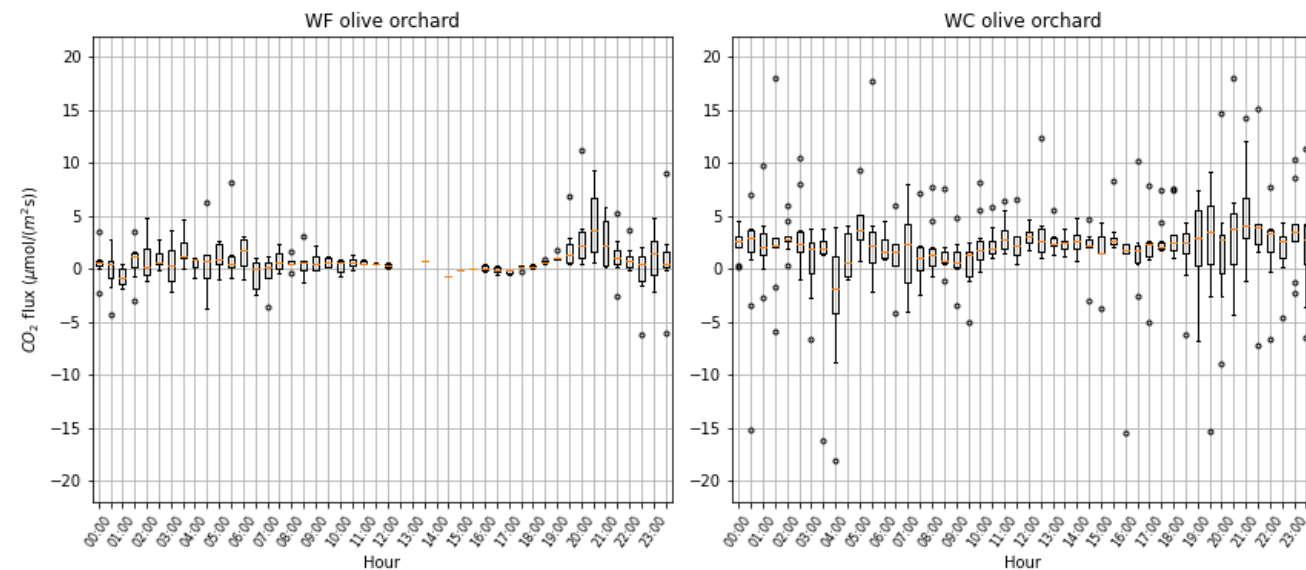
RESULTS

Before mowing 2021 →

Boxplot for CO₂ fluxes during a typical day for the period 15/03/21 - 05/05/21



Boxplot for CO₂ fluxes during a typical day for the period 10/05/21 - 23/05/21



← After mowing 2021



DISCUSSION AND FUTURE WORK

- C uptake during growth season in WC soil
- C release during all period in WF soil
- After mowing, respiration from WC soil is higher than resp. from WF soil
- Global subcanopy balances cannot be estimated with these data
- Future work should consider data from soil chambers and improve data selection methods

THANK YOU

Email: jangelcalrod@correo.ugr.es

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SCIENCE
is **SOCIETY**